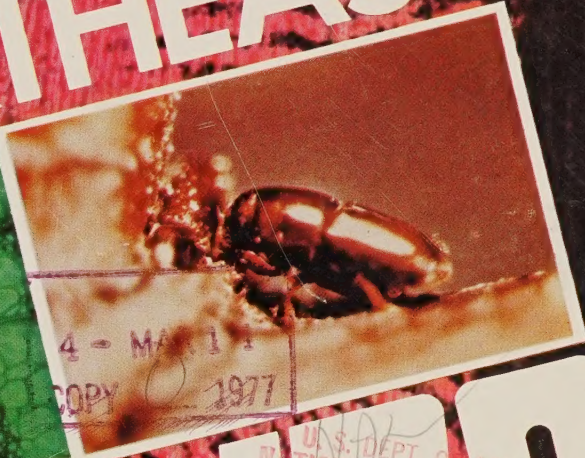
# Forest pest conditions in the NORTHEAST







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U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
NORTHEASTERN AREA STATE AND
PRIVATE FORESTRY—UPPER DARBY, PA 19082

**Appreciation is extended to all the State agencies whose assistance and cooperation made this report possible. (See back cover for cooperators)**

Appreciation is extended to the staff in the Office of Information, Eastern Region, Forest Service, USDA, for their role in the production of this publication.

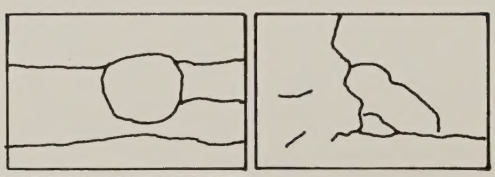
**Photo Credits:**

**Fig. 4. – Illinois Natural History Survey.**

**Fig. 5. – Al Miller, West Virginia Department of Agriculture**

**Cover photos: Dutch elm disease**

**Top left: tylosis in water conducting vessel.**



**Top right: smaller European elm bark beetle.**

**Background: Brood gallery of smaller European elm bark beetle.**

**Bottom left: color infrared photo showing dead and fading elms.**

**Bottom right: Elm infected with Dutch elm disease.**

# '76

## FOREST PEST CONDITIONS IN THE NORTHEAST '76

by

J. B. HANSON

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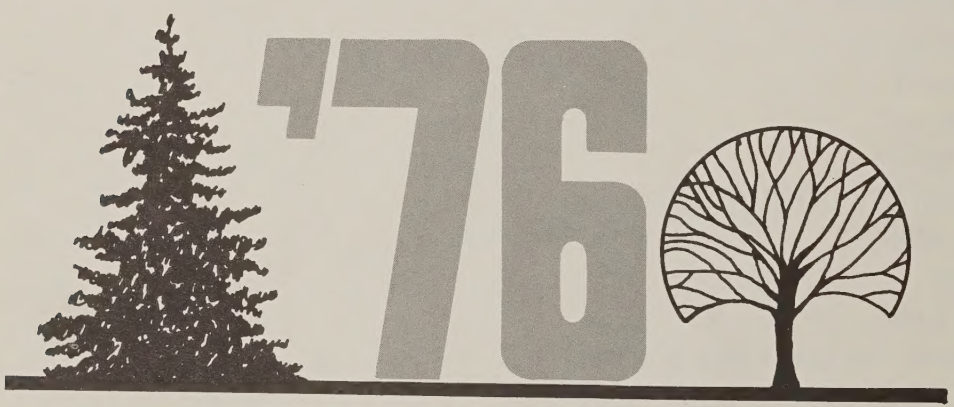

Stand defoliated by the spruce budworm.

# CONDITIONS IN BRIEF

The spruce budworm caused the most damage in the 20-State Northeastern Area again in 1976. Over 6.2 million acres were affected. Maine suffered defoliation on 4 million acres, Minnesota 1.2 million acres, and Michigan 815,000 acres. Other states having heavy damage were Wisconsin and New Hampshire. In Maine, about 3.5 million acres of spruce-fir were aerially treated for foliage protection in 1976. A smaller spray program, about 900,000 acres, is anticipated for 1977. The 854,000 acres defoliated by the gypsy moth was a dramatic increase over 1975. Pennsylvania accounted for almost all of the increase. Fifty-thousand acres were treated in 1976 under the cooperative suppression program for the gypsy moth. The forest tent caterpillar remained at high levels in Michigan with about 333,000 acres being defoliated. Populations of the caterpillar remain in Minnesota, but appear to be increasing in nearby Canada. The saddled prominent is making a resurgence after several years of no reports. Maine sustained most of the damage, with over one-half million acres of northern hardwoods being defoliated. Populations of the cankerworm remained high in 1976. Pennsylvania reported over 700,000 acres of defoliation.

Dutch elm disease continued to cause considerable mortality in the Lake States. However, the registration of Lignasan® BLP[1] offered another alternative in protecting elms against the disease. Scleroderris continues to cause concern in New York, where it is causing mortality of all tree sizes. In the Lake States, this disease has traditionally been a pest of smaller plantation trees. Researchers are investigating the situation to determine why the fungus is behaving differently in New York. Maple decline increased drastically in 1976. Most of the damage was reported in the Lake States, Vermont, New York, and New Hampshire. Diplodia tip blight was especially severe on red and jack pine in Wisconsin, during the summer of 1976. This disease could be a serious problem to some of our pine species in the future.

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[1] This publication reports research involving pesticides. It does not contain recommendations for their use nor does it imply that the uses discussed here have been registered. All uses of pesticides must be registered by appropriate State and/or Federal agencies before they can be recommended.

# STATUS OF INSECTS–CONIFER DEFOLIATORS

Fig. 1. – Early stage of spruce budworm larva.

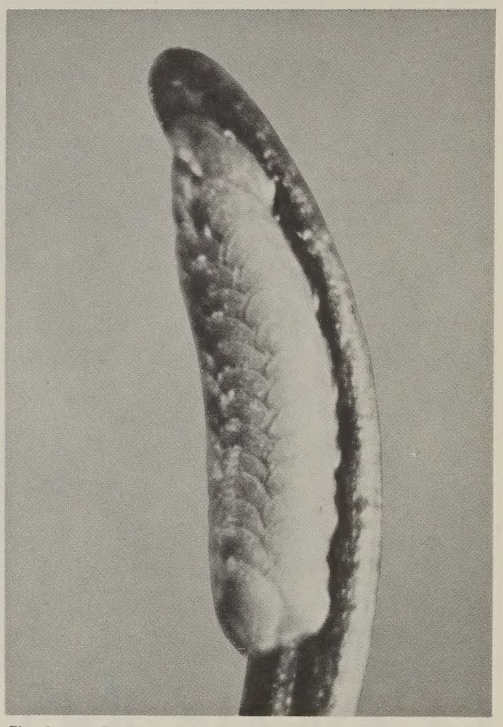

Fig. 2. – Egg mass of spruce budworm.

## SPRUCE BUDWORM,

*Choristoneura fumiferana* (CLEMENS)

This pest continued in 1976, as the most serious conifer defoliator in the Northeastern Area (Fig. 1). In the East, budworm populations appeared to be on the rise. New Hampshire reported 100,000 acres of discernible defoliation in the northeastern portion of the State. Surveys in New York revealed light infestations on all 250,000 acres of spruce-fir type. Vermont also had increasing populations, with 5,000 acres having light to moderate defoliation. Only in Maine was a decrease noted. Here, approximately 4 million acres of spruce-fir type vegetation suffered moderate to heavy defoliation, compared to 7 million acres in 1975.

The budworm was also a major problem in the Lake States (Fig. 2). Infestations in northeastern Minnesota drastically increased, over 1.2 million acres were defoliated, with all but 80,000 acres listed as severe. In Upper Michigan, nearly all of the spruce-fir type was involved in some stage of the budworm outbreak. Defoliation was recorded on 815,000 Michigan acres in the summer; almost 90 percent of this was in the heavy defoliation category. In Lower Michigan, populations declined because most of the balsam fir had already been killed or was in a declining phase. Wisconsin reports an increase in defoliation in the northeastern portion of the state; 104,000 acres were defoliated in 1976. About 70,000 of these acres were classified as having moderate to severe defoliation.

During 1976, a number of pilot control projects were conducted against the budworm by the Forest Service and University of Maine. Insecticides tested included two formulations and varying dosages of Dylox,® Sevin® 4 Oil, Orthene,® Matacil,® Lannate,® and Thuricide.® The Forest Service project indicated that Orthene at 0.50 lb/acre was the most effective chemical tested. It reduced larval populations by 94 percent and defoliation by 34 percent. Preliminary results from the University of Maine showed that Matacil at 2.4 oz/acre and Dylox 4 at 1 lb/acre reduced larval populations to one or less larva per branch sample. Matacil saved 85 percent of foliage, whereas, Dylox gave acceptable levels of foliage protection at all dosages. Further details on dosages and individual test acreages may be obtained from the Forest Service or the University of Maine.

In June 1976, 3.5 million acres of spruce-fir in Maine's Aroostook, Piscataquis, Penobscot, and Washington Counties were aerially treated for foliage protection against the budworm. Of the acreage sprayed, all except 40,000 acres were treated with Sevin 4 Oil at 0.75 lb/acre. Dylox at 1 lb/acre was used on the remaining project area.

A proposal to treat approximately 930,000 acres in Maine, is under consideration for 1977.

## JACK PINE BUDWORM,
*Choristoneura pinus* FREEMAN

Jack pine budworm populations in Michigan continued to decline from the outbreak high of 500,000 acres in 1974. Only 5,000 acres of light defoliation was recorded in Presque Isle County. The populations collapsed in Wisconsin during the summer, forcing cancellation of the Sevin 4 Oil and Dimilin field tests. About 11,500 acres in central and northwest Minnesota were reported as moderately defoliated; however, egg surveys following the egg laying period indicated a population collapse. The bacterial insecticide, Thuricide® 16B, is now registered for budworm control, following successful tests in Wisconsin in 1975.

## ARBORVITAE LEAFMINER,
*Argyresthia thuiella* (PACKARD)

High populations of this leafminer continued throughout most of Upper Michigan, affecting 150,000 acres. A Michigan survey showed mortality caused by the complex averaged about 1 percent. Defoliation was more severe on the edge of a stand, and at least three species of leafminers were involved in the outbreak. The population is expected to decrease in 1977.

## LARCH CASEBEARER,
*Coleophora laricella* (HÜBNER)

Casebearer populations were reported in Pennsylvania, New Jersey, and Vermont in 1976. In the latter two States, it was considered a seed orchard problem.

## BALSAM GALL MIDGE,
*Dasineura balsamicola* (LINTNER)

Damage by this midge continued in Wisconsin, Vermont, and New Hampshire. Attempts to control this insect in Vermont with dimethoate and malathion failed. These same insecticides were tested in Wisconsin in 1974, with poor results. Although this is a pest of both plantation and natural stands, it is a major problem to Christmas tree growers producing balsam. Vermont noted that parasitism by *Tetrastichus marcovitchi* was 3 percent.

## CONIFER SAWFLIES

The introduced pine sawfly, *Diprion similis* (Hartig), continues to pose a problem on the Red Lake Indian Reservation in Minnesota. About 3,600 acres of white pine were affected; half of the damage was in the moderate to severe category. With the exception of Michigan, the larch sawfly caused moderate to severe damage throughout the Lake States. In the East, Maine recorded heavy damage for the third year. Small localized infestations were also reported from Vermont and Pennsylvania. The European pine sawfly, *Neodiprion sertifer* (Geoffroy), populations, except in Ohio, were low this year. Several University of Wisconsin entomologists, used natural phermone baited traps to capture male European pine sawflies beyond their known northward distribution. Michigan and Minnesota reported locally severe defoliation on white spruce, caused by the yellow-headed spruce sawfly, *Pikonema alaskensis* (Rohwer). Several plantations in Minnesota were treated to prevent their defoliation. The jack pine sawfly, *Neodiprion pratti banksianae* Rohwer caused light to moderate defoliation on 2,000 acres in Michigan.

# HARDWOOD DEFOLIATORS

## GYPSY MOTH,
*Lymantria dispar* (L.)

Gypsy moth populations have increased substantially since 1975 (Table 1). In 1976, defoliation exceeded the previous year's level by 390,000 acres. Pennsylvania accounted for 82 percent of this increase. Much of Pennsylvania's increase occurred in the Pocono Mountains, where infestations had collapsed following severe defoliation in 1973. There was no correlation in the buildup between areas that had been sprayed earlier and those that had not. Resurgence of the gypsy moth in the area was not expected in such a short period of time.

The cooperative suppression programs involved about 45,000 acres in New Jersey and 5,000 acres in Rhode Island. Both States used carbaryl as the primary insecticide. The Michigan Department of Agriculture, in cooperation with the Animal and Plant Health Inspection Service, USDA, treated 16,330 acres with carbaryl in an attempt to eradicate the gypsy moth in central Michigan. Involved in the treatment were Isabella, Midland, and Montcalm Counties.

The Disparlure bait trapping program continued in 1976. No male moths were reported from Missouri. On the following page, is a chart showing the extent of defoliation, by State, for 1975 and 1976, along with a list of gypsy moth captures for 1976.

**ON THE FOLLOWING PAGE IS A LIST OF MOTH CATCHES FOR 1976**

Table 1.
Area defoliated by the gypsy moth (in acres)

| State | Year 1975 | Year 1976 |
|---|---|---|
| Connecticut | 63,411 | 9,809 |
| Maine | 110 | 0 |
| Massachusetts | 17,900 | 31,720 |
| New Jersey | 55,400 | 45,850 |
| New York | 9,275 | 26,593 |
| Pennsylvania | 317,800 | 732,310 |
| Rhode Island | 435 | 7,540 |
| Vermont | 30 | 750 |
| Totals | 464,361 | 854,572 |

**Gypsy Moth Captures in 1976**

- West Virginia—9 male moths: Jefferson and Berkley Counties
- Ohio—4 male moths: Fayette, Richland, Montgomery, and Erie Counties
- Michigan— 432 male moths: Graton, Isabella, Midland, and Montcalm Counties
- Illinois—2 male moths: Cook and Will Counties
- Wisconsin—11 male moths: Outagamie, Calumet, and Dane Counties
- Minnesota—1 male moth: Hennipen County

Gypsy moth parasite releases were reported by Pennsylvania and Wisconsin in 1976. The Pennsylvania releases involved 6 parasite species and about 476,000 insects. Wisconsin's releases included *Compsilura concinata* and *Brachymeria intermedia;* 12,000 parasites were released.

Several other noteworthy items were reported by State cooperators. Vermont reported that extreme cold weather prevented 97 percent of the overwintering egg masses located 2 feet or more above the ground from hatching. An estimated 92 percent of the egg masses were located above the 2 foot height level. However, the cold weather did not prevent populations from dramatically increasing in northern Vermont. New Jersey conducted a gypsy moth impact study in 1976. Several of the findings are noted here: losses, including repainting houses, plant replacement, tree removal, and treatment averaged $51.35 per acre; the average homeowner is willing to pay $111 per acre to treat and protect his property from gypsy moth damage. Pennsylvania personnel have been conducting damage appraisals since 1971. Appraisals have been conducted on 808,000 acres of forest land which has been defoliated by the gypsy moth for two or more consecutive years. The findings showed an average mortality rate of 20 percent. There was a total loss of 236 million board feet of sawtimber and 234 million cubic feet of pulpwood, with a combined value of $8,357,600. Of the trees killed, 94 percent were oak. This data does not reflect the 1976 appraisal survey. A gypsy moth infestation was detected in San Jose, California, recently. Egg masses for 1976, along with older egg masses, were found on several trees.

Testing of Dimilin,® Orthene, and the gypsy moth virus continued in 1976. Dimilin wettable powder and oil formulations provided 90-100 percent larval reduction at dosages of 0.01 and 0.06 lb/acre. Dimilin is currently registered for gypsy moth control at 0.03-0.06 lb/acre. Orthene was tested at 0.38 and 0.50 lb/acre and provided 75-99 percent larval reduction. Virus testing also provided encouraging results. In general, when virus treated plots were compared to untreated plots, the number of live larvae were reduced, presence of virus-killed larvae increased, and significant foliage protection was attained. Registration of the virus is expected in 1977.

## FALL CANKERWORM,
*Alsophila pometaria* (HARRIS)

Cankerworm populations were found to be in outbreak proportions again in 1976. Infestations were

reported from Pennsylvania, New Jersey, Rhode Island, Maine, New York, Illinois, and Wisconsin. Pennsylvania reported the largest area defoliated by the looper, over 700,000 acres. Although no acreage was reported from Wisconsin, pockets of heavy defoliation could be found throughout the southern portion of the State.

The community of Elm Grove, Wisconsin, a Milwaukee suburb, was treated with *Bacillus thuringiensis* to minimize the caterpillar's impact. New Jersey reported that about 3,500 acres were defoliated in 1976. Here, unlike the complex found in other States, the cankerworm was found in association with oak leaf rollers. In New Jersey, 3,500 acres were treated with carbaryl to control cankerworm populations. New York plans a suppression effort in Steuben County in 1977. All States, except New Jersey, reported unusually high populations of *Calosoma* beetles preying on the cankerworm complex. In many areas, numerous calls were received concerning the beetle and not the cankerworm. The linden looper was the predominent species associated with the cankerworm in Pennsylvania.

## FOREST TENT CATERPILLAR,

*Malacosoma disstria* HÜBNER

Although forest tent caterpillar activity in Upper Michigan declined somewhat in 1976, it still remains at a high level, with 133,000 acres suffering defoliation. About 200,000 acres had been defoliated in the Upper Peninsula in 1975. Elsewhere, Indiana reported 15,000 acres, and Vermont 4,500 acres, defoliated by the caterpillar. Even though both States reported that a "wilt" disease caused some mortality, they expect about the same level of defoliation in 1977. Infestations were also reported in Rhode Island, New York, and Maine. Populations in Minnesota remain at low levels; however, a larger population is developing in the Province of Manitoba, and this may signal a problem for Minnesota in the near future.

## OAK LEAFTIER COMPLEX,

*Croesia albicomana* (CLEMENS), *Archips semiferanus* (WALKER), and other species.

This tier roller complex continued to be a problem in West Virginia, where over 100,000 acres were defoliated. Massachusetts noted 20,000 acres of damage in 1976, a considerable increase over the defoliation of 1975. In the Lake States, only Michigan reported damage by *A. semiferanus;* five counties in Lower Michigan had moderate to heavy defoliation, while the Upper Peninsula suffered 6,000 acres of damage. Only 1,000 acres of defoliation were detected in Pennsylvania in 1976.

## LARGE ASPEN TORTRIX,

*Choristoneura conflictana* (WALKER)

Defoliation by this tortrix was reported in Vermont and Minnesota. The population in Minnesota is on the rise, with 15,000 acres being defoliated in 1976, compared to no detectable damage the year before. The population in Vermont remains high, with 11,500 acres defoliated again in 1976.

## MAPLE LEAFCUTTER,

*Paraclemensia acerifoliella* (FITCH)

In Vermont, the leafcutter caused serious concern when it defoliated large acreages for the second consecutive year. Thirty-four thousand acres were defoliated in 1976, an increase of 3,000 acres over the previous year. Efficacy data, collected in support of registering carbaryl, was collected when 442 acres of sugar bushes with heavy leafcutter populations were treated with Sevin® 80 Sprayable at 1 lb/acre. Good control was reported. Defoliation also occurred in New Hampshire and Michigan.

## SADDLED PROMINENT,

*Heterocampa guttivitta* (WALKER)

This pest appears to be making a resurgence after several years of no reports (Fig. 3). Maine sustained most of the damage, with over a half million acres of beech, birch, sugar maple, and red maple receiving severe defoliation. Michigan reports 15,000 acres and Wisconsin 10,000 acres at varying damage levels. Although not always mentioned, the saddled prominent is the dominant species in a complex of hardwood defoliators which usually includes other *Heterocampa, Symmerista,* and *Anisota* species.

## WALNUT CATERPILLAR,

*Datana integerrima* GROTE & ROBINSON

Infestations of this Datana caused moderate damage in southeastern Illinois, and heavy damage in southwest Missouri (Fig. 4). Excellent control was achieved in Illinois, with Diazinon,® malathion, Orthene, and *Bacillus thuringiensis.*

## AN OAK SAWFLY,

*Caliroa quercuscoccineae* (DYAR)

The unusual occurrence of this slug-like sawfly

Fig. 3. — Adult moth of the saddled prominent.

Fig. 4. — Larval stage of the walnut caterpillar.

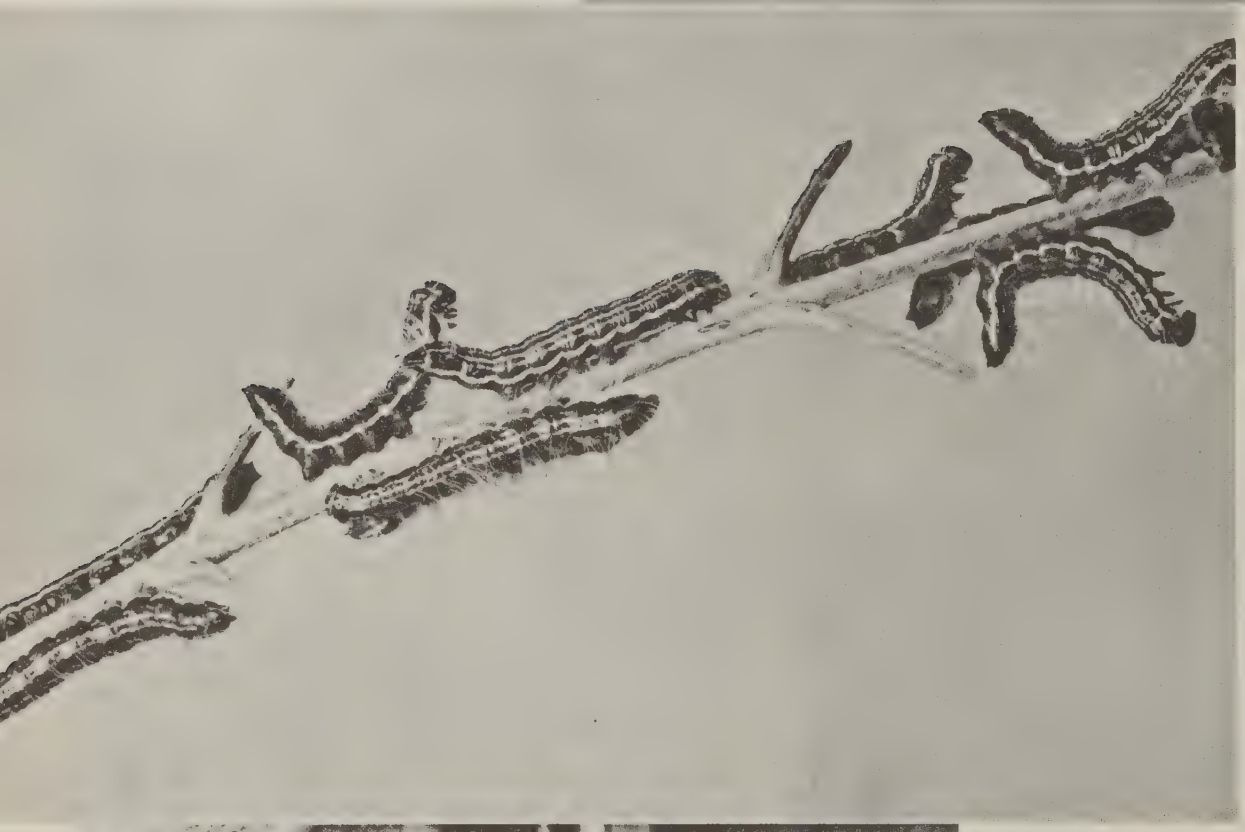

Fig. 5. — Slug-like oak sawfly larvae.

caused about 100,000 acres of defoliation on oak in West Virginia during 1976 (Fig. 5). The sawfly has two generations per year. The first generation occurs in early July, and the second in late August or early September. A Dimilin field test against the sawfly is being planned for 1977.

### FALL WEBWORM,
*Hyphantria cunea* (DRURY)

This insect's webs were observed over much of the Northeastern Area in 1976. Pennsylvania, West Virginia, Ohio, Missouri, Indiana, New England, and New York reported web sightings. Although the populations haven't reached the level of the early 1970's, heavy defoliation did occur in Massachusetts, West Virginia and Missouri.

### BIRCH LEAFMINER,
*Fenusa pusilla* (LEPELETIER)

Damage by this miner was statewide in Rhode Island and Vermont, and it continues to be one of the major shade tree pests in both States. Heavy infestations were also noted at the local level in Maine, Upper Michigan, and northern Wisconsin.

# MISCELLANEOUS DEFOLIATORS

The locust leafminer, *Xenochalepus dorsalis* (Thunberg) again caused heavy damage on black locust trees in Ohio, West Virginia, and Pennsylvania. The Asiatic oak weevil caused problems in West Virginia and Missouri; about 2,000 acres were affected in West Virginia. An outbreak of the orangestriped oakworm, *Anisota senatoria* (J. E. Smith) occurred in New Jersey during September, where heavy defoliation was recorded in portions of four counties.

# SUCKING INSECTS

### SPITTLEBUGS,
*Aphrophora saratogensis* (FITCH) and *A. parallela* (SAY)

Damage caused by the Saratoga spittlebug has been on the upswing recently, especially in Wisconsin and Michigan. In Michigan, some of the plantation damage was so severe it did not warrant suppression measures. Wisconsin had severe damage on about 150 acres, and this area was treated. An additional 500 acres are known to have heavy populations and may have to be treated in 1977. The pine spittlebug caused some mortality and flagging on an 85 acre Christmas tree plantation in Pennsylvania. Heavy infestations of the pine spittlebug also occurred on white pine and balsam fir in southern New Hampshire. Indiana also reported the pine spittlebug to be a statewide Christmas tree problem in 1976.

### RED PINE SCALE,
*Matsucoccus resinosae* BEAN & GODWIN

This scale is presently established in New Jersey, New York, and Connecticut (Fig. 6). Guidelines for transportation of red pine and/or quarantine measures exist in Connecticut and New Jersey. New York doesn't have a quarantine on the transportation of infested material as yet. New Jersey personnel attempted to control the scale by using Cygon® 2E as a foliage and soil drench. At best, the treatment reduced the scale population by only 49 percent. Currently, the only alternative to chemical treatment is the cutting and burning of infested trees.

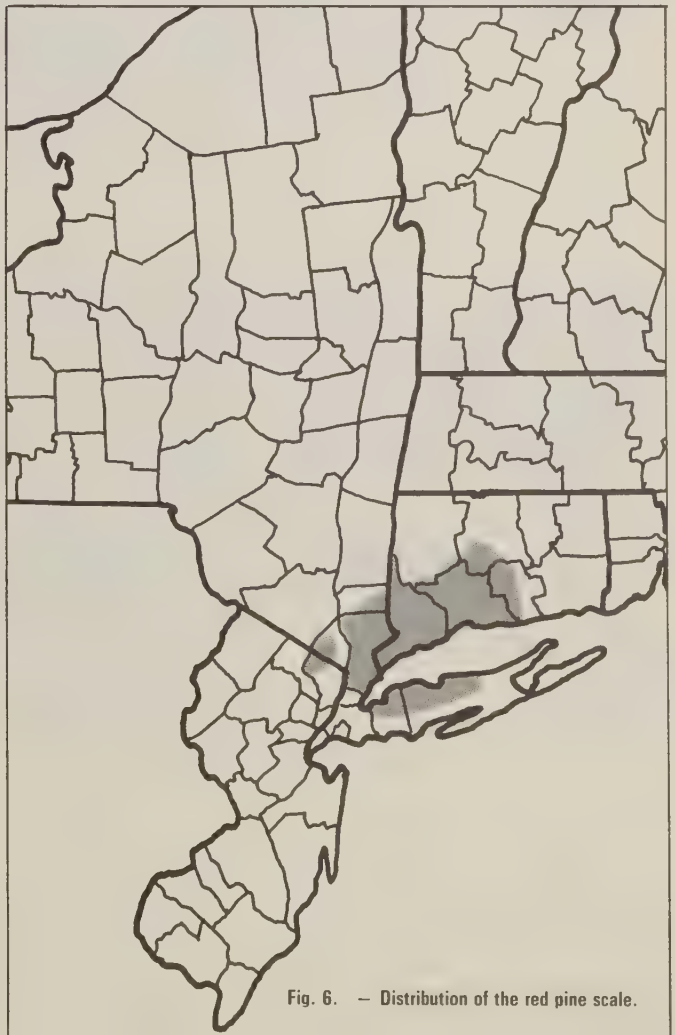

Fig. 6. – Distribution of the red pine scale.

# BUD, SHOOT, STEM, AND ROOT INSECTS

## NANTUCKET PINE TIP MOTH,

*Rhyacionia frustrana* (COMSTOCK)

This tip moth caused considerable damage at Lakin Nursery and Scotch pine plantations throughout West Virginia. Populations also remain high on Cape Cod, Massachusetts, where many pitch pine stands are being severely damaged.

Fig. 7. – Larval stage of the pine root tip weevil.

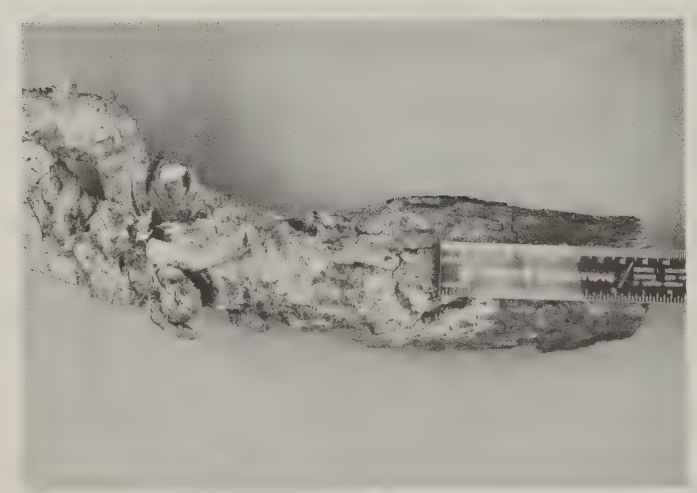

Fig. 8. – Damage caused by the pine root collar weevil.

## BLACK WALNUT SHOOT MOTHS,

*Acrobasis demotella* GROTE and *A. juglandis* (LeBARON)

A cooperative research project on these two pests continued for the second year in Michigan. Major accomplishments in 1976, included completing life history studies on *A. demotella* and conducting additional testing of systematic insecticides. In Wisconsin, high populations of *A. juglandis* in a number of 5 to 10 year old plantations collapsed before going into overwintering hibernacula. Overwintering hibernacula in one plantation failed to emerge this past spring. No reasons were given for the collapse of these populations. Both species caused damage in Indiana plantations over 3 years old. State and Private Forestry conducted a survey on many of the nurseries in the Eastern United States that are producing walnut seedlings. Some of the areas covered were insect and disease problems, soil management, plant nutrition, mycorrhizae, and pesticide management. A report should be available in early 1977.

## PINE ROOT TIP WEEVIL,

*Hylobius rhizophagus*

MILLERS, BENJAMIN, AND WARNER

Flagging and tree mortality continued in Scotch pine areas in Lower Michigan (Fig. 7). A 10 county survey showed 75 percent of the trees had some degree of flagging, with mortality averaging about 15 percent.

## PINE ROOT COLLAR WEEVIL,

*Hylobius radicis* BUCHANAN

A greater number of red pine plantations in Lower Michigan are sustaining mortality from this weevil. (Fig. 8). In high hazard areas, State personnel recommend not planting red pine within one-half mile of infested stands and early duff removal and basal pruning of susceptible stands.

## BARK BEETLES,

*Ips pini* (SAY) and other species.

An anticipated upsurge in Michigan and Wisconsin was expected in the summer, because of abnormally dry conditions, but little, bark beetle activity has yet been reported. Normally, landowners notice the dead and dying trees in late winter or early spring. Damage has been occurring in overstocked stands, windbreaks, and in areas of active timber sales. West Virginia reported having many calls relating to *Ips* and southern pine beetle damage.

# STATUS OF DISEASES - VASCULAR

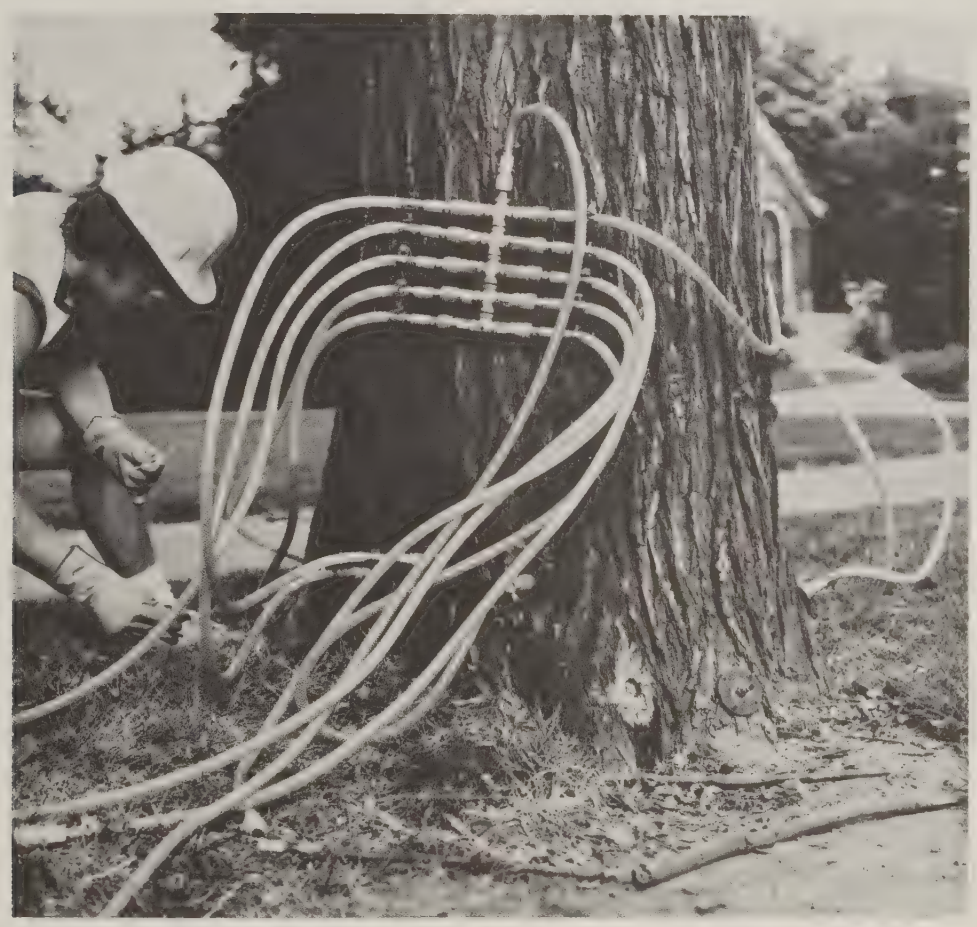

Fig. 9. – Elm tree being injected with Lignasan.

## DUTCH ELM DISEASE CAUSED BY

*Ceratocystis ulmi* (BUISM.) C. MOR

This disease continues to increase in Upper Michigan, Wisconsin and Minnesota. In the Minneapolis metropolitan area alone, 25,000 trees were lost to Dutch elm disease in 1976; 10,000 trees were lost due to this disease in 1975. This 7 county area encompasses the Twin Cities and has 4 million elm shade trees (Fig. 9). Other States noting losses were Iowa, Vermont, Indiana, and West Virginia. Lignasan® BLP gave an additional option for the control of this disease in 1976. Lignasan is a more soluble form of benomyl, and is registered for tree injection by licensed arborists only.

## OAK WILT CAUSED BY

*Ceratocystis fagacearum* (BRETZ) HUNT

Oak wilt appears to be endemic to Michigan, Missouri, Iowa, Indiana, Illinois and West Virginia. However, it is still a serious pest in Wisconsin and Minnesota. Minnesota reports that the impact of oak wilt on woodlots is greater than from Dutch elm disease. An aerial survey in Iowa, revealed that there was only 0.9 percent incidence of oak wilt over the 8,800 acres surveyed.

# FOLIAGE DISEASES

Fig. 10. – Damage caused by Venturia shoot blight.

## ANTHRACNOSE CAUSED BY SPECIES OF

*Gnomonia, Gloeosporium, Marssonina,* and others.

The incidence of anthracnose was high in Iowa, Michigan, Massachusetts, Vermont, Minnesota, New York, West Virginia, and Pennsylvania in 1976. Anthracnose of chestnut and white oak was especially severe throughout Pennsylvania. Widespread occurrence of anthracnose on ash was also observed. In Michigan, it was common on sycamore, oak, and maple in the southern portion of the State.

## VENTURIA SHOOT BLIGHT CAUSED BY

*Venturia populina* (VUILL.) FABRIC.

Aspen shoot blight continues to be a problem on aspen regeneration, causing top kill and dieback of the current year's shoots (Fig. 10). This was evident throughout the Lake States during the past season.

## LOPHODERMIUM NEEDLE CAST CAUSED BY

*Lophodermium pinastri* (SCHRAD. ex HOOK.) CHEV.

This needle cast was at an extremely low level in 1976, reported only from Vermont and Indiana. Control was needed in several Christmas tree plantations in Vermont.

## PINE NEEDLE RUST CAUSED BY

*Coleosporium* spp.

This needle rust was observed in Michigan and Indiana in 1976. Wet weather during August, 1975, was responsible for the high number of reports of this disease in young red pine plantations in southern Michigan in the spring. This disease caused serious damage to trees suppressed by competing vegetation. Control of weeds and competing vegetation allowed trees to dry quickly and reduced the incidence of infection. A pamphlet on this disease has been printed and is available from the Forest Service.

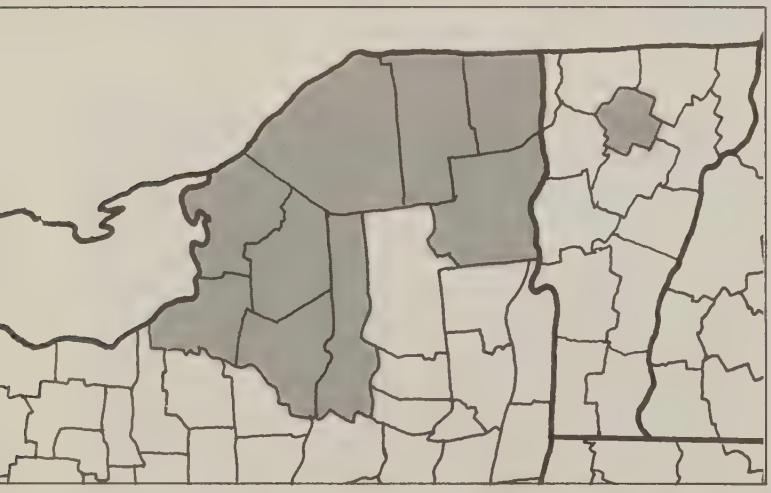

Fig. 11. – Distribution of Scleroderris canker in New York.

## RED PINE SHOOT BLIGHT CAUSED BY

*Sirococcus strobilinus* (PRUESS)

This disease continues to damage shoots and kill red pine reproduction in northeastern Wisconsin. The removal of overstory trees has proven effective in reducing the severity and incidence of overstory infection. This silvicultural technique enables land managers to keep disease associated losses at a minimum.

# STEM DISEASES

## SCLERODERRIS CANKER CAUSED BY

*Gremmeniella abietina* (LARGERB.) MORLET,
(= *Scleroderris lagerbergii* (GREMMEN))

An evaluation survey in Upper Michigan showed the major impact to be in Schoolcraft and Luce Counties. This disease has prohibited reforestation in about a 25,000 acre area. Test plantings using resistant varieties of Scotch pine will be made in the future.

A survey in New York showed the disease present in 93 out of 128 plantations examined; this is up from the 77 plantations found infected in 1973 (Fig. 11). A sharp increase in stand infection is expected in 1977, because of 1976's wet spring and summer. The disease also killed trees of all sizes in New York; whereas, in the Lake States, it was a problem of smaller plantation trees. Researchers are investigating the situation to determine why the fungus is behaving differently in New York.

Fig. 12. – Small black fruiting bodies of *Diplodia pinea* on red pine.

## DIPLODIA TIP BLIGHT CAUSED BY

*Diplodia pinea* (DESM.) KICKX

This disease has killed red, jack, Scotch Austrian, and Ponderosa pine (Fig. 12). Losses were particularly severe during the summer of 1976, on red and jack pine in central Wisconsin. The trees that are affected have sandy soils and have experienced drought conditions over the past 2 years. Pathologists in Wisconsin are concerned that this blight could be a serious problem in the near future. Vermont and Minnesota also reported evidence of the disease. Severe blighting and killing of Austrian pine was diagnosed in several locations in Ohio this past summer. West Virginia reported severe damage to one plantation.

## BEECH BARK DISEASE CAUSED BY

a combination of Beech Scales and the fungus *Nectria coccinea* var. *faginata* (LOH., WATS, and AY.)

Populations of one of the beech scales, *Cryptococcus fagi* (Baer), were down in most of the Northeast in 1976. However, a survey showed that about 20 percent of the large beech in New Hampshire have been killed by this disease since 1959. The disease continues to spread westward in New York. Heavy salvage cuts are being made on State forests in south-central New York. The known distribution remains the same in Pennsylvania, and mortality is occurring throughout the area where the complex is found.

## SWEETFERN RUST CAUSED BY

*Cronartium comptoniae* (ARTH.)

This disease continues to be a serious pest in jack pine stands in the Lake States. One stand in Minnesota was found with 80 percent of the stems infested.

## CANKERS CAUSED BY

*Nectria, Fusarium,* and other fungi.

The State of Michigan and the Forest Service conducted a survey of Nectria canker on yellow birch in the Upper Penisula during 1976. Specific hazard zones, where the disease is having a significant impact on the management of yellow birch, were identified. In most cases, it was found that the severity of infection increased as the surveyors moved closer to the Great Lakes. The "Lake effect" can have a significant impact on the management of northern hardwoods in the Upper Penisula. In New England, yellow birch canker and shoot blight caused by *Diaporthe alleghaniensis* R. H. Arn. and *Gnomonia setacea* (PERS. ex FR.) CES. & DE NOT. posed problems in past logging regeneration. Indiana reported several canker problems in plantation hardwoods. Fusarium cankering symptoms, similar to those reported by Kessler in the Plant Disease Reporter (58:11), were found on black walnut in northern Indiana. The canker caused dieback, and extended from the root collar to some 2 feet above the ground. Hypoxylon canker of aspen continues to kill about 10 percent of the aspen stems in the Lake States each year (Fig. 13). A publication on this disease is available from either the State and Private, U.S. Forest Service, Upper Darby, Pennsylvania, or the North Central Forest Experiment Station.

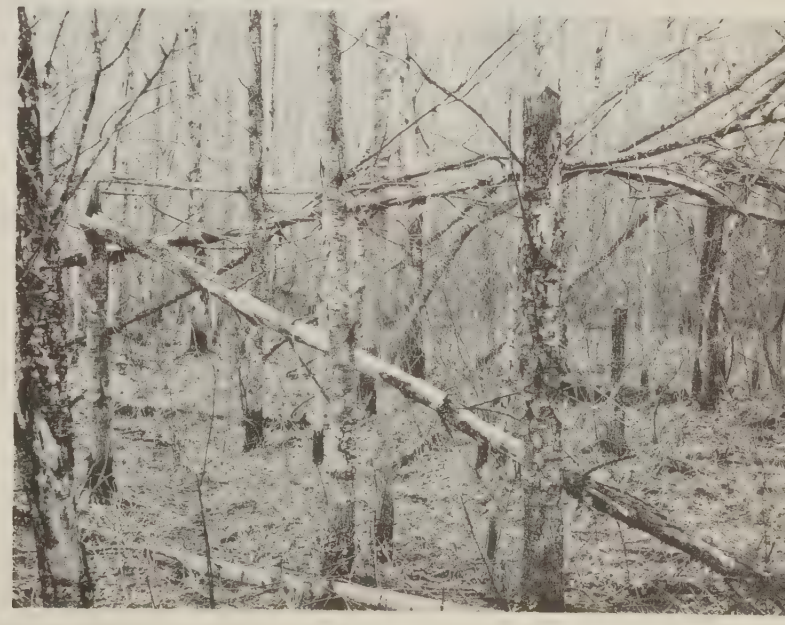

Fig. 13. – Damage in aspen stand caused by hypoxylon canker.

# ROOT ROT DISEASES

## WHITE PINE ROOT DECLINE CAUSED BY

*Verticicladiella procera* (KEND.)

The incidence of this disease appears to be increasing in Pennsylvania, Ohio, and West Virginia. The disease's presence in Pennsylvania has been suspected since 1968, but the first culture confirmation was obtained in the summer of 1976. Mortality of 20 percent of the trees in a plantation is common where the disease occurs. Both West Virginia and Ohio had heavy losses due to the root decline in 1976.

## ARMILLARIA ROOT ROT CAUSED BY

*Armillaria mellea* (VAHL. ex FR.)

Reports of Armillaria root rot causing pine mortality were more common and severe in 1976, because of the drought conditions which existed in portions of the Northeastern Area. Wisconsin reported mortality in red pine, jack pine, and Scotch pine stands. In some local areas, mortality was as high as 25 percent. Several reports were received from Minnesota, where this disease was killing conifers planted in cutover hardwood areas. The disease also caused spruce mortality in Massachusetts and Vermont.

## NURSERY ROOT ROTS

A new root rot of pine species was found in Wisconsin and Minnesota in 1976. The cause and control measures are being studied. Root rot by various fungi, *Phytophthora, Fusarium, Pythium, Phomopsis,* and *Cylindrocladium,* killed 10 percent of the black walnut seedlings at the Vallonia Nursery in Indiana. Root rot was brought on by heavy watering which was done to prevent spring frost damage.

# MISCELLANEOUS DISEASES

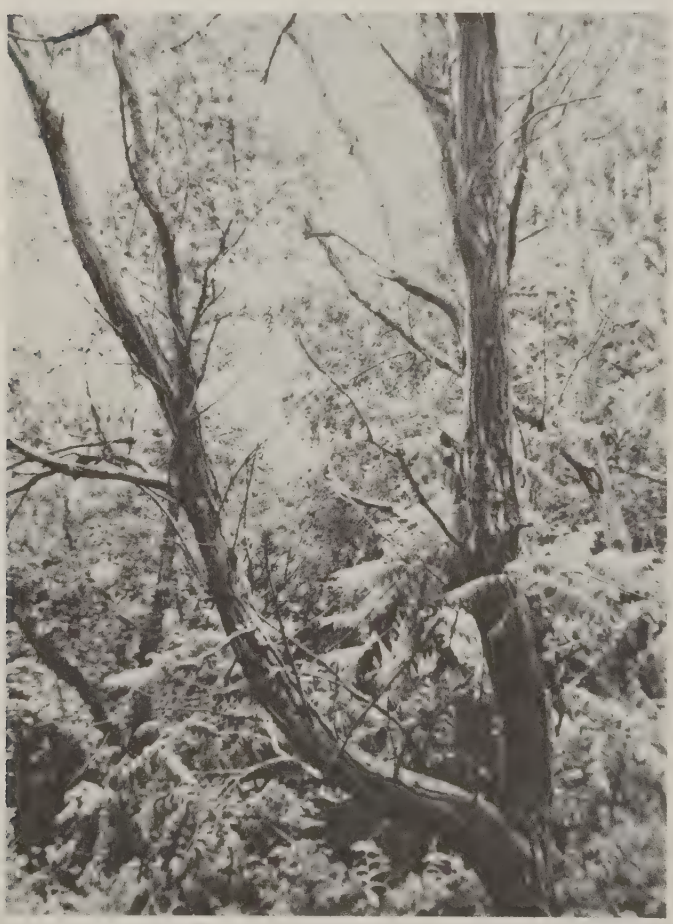

Fig. 14. – Damage typical of that caused by butternut decline.

## OAK MORTALITY, CAUSE(S) UNKNOWN

Oak mortality occurred in Missouri, Illinois, Indiana, Ohio, Pennsylvania, West Virginia, and New Jersey. Some variations did occur in the order of symptoms, but generally, the trees followed this basic sequence: the tree failed to leaf out in the spring, or if it did, the leaves expanded only a fraction of their normal size; the tree died in late summer; and, the leaves remained on the dead trees, contrary to the premature leaf fall in oak wilt trees. Studies of this situation are presently underway in Illinois, Pennsylvania, and New Jersey.

## BUTTERNUT DECLINE, CAUSE UNKNOWN

Butternut decline was first observed in Wisconsin in 1967, but was recently found in Michigan, Minnesota, and Iowa (Fig. 14). Preliminary findings indicate that a fungus may be involved in the

cankering. Tests at the University of Wisconsin showed that the isolated fungus incited cankers on black walnut seedlings in the greenhouse. A nationwide survey is currently underway, and should show the distribution of the disease in 1976.

## MAPLE DECLINE, CAUSE(S) UNKNOWN

The incidence of maple decline increased drastically in 1976. Most of the reports involved urban areas or roadside trees. However, several States did note it in forested situations, too. Stress factors such as drought, salt, soil compaction, etc., undoubtedly played an important role in the upsurge of maple decline. States reporting maple decline were Michigan, Wisconsin, Vermont, New Hampshire, New York, and Indiana.

## WEATHER RELATED DAMAGE

A major ice storm in early March, caused widespread damage to vegetation across southern Wisconsin and southern Michigan. High winds followed ice accumulations of up to 5 inches. This resulted in total destruction of trees or drastic breakage of branches. The storm's long range effects on the incidence of decay and other pest problems will not be known for many years.

Late spring frosts caused damage to plant growth in Missouri, Michigan, and Pennsylvania. Vermont had a snow storm on May 19, which accounted for extensive leaf, branch, and top damage over thousands of acres. The damage was even more extensive at higher elevations.

The severe drought which occurred over much of Wisconsin and Minnesota during 1976, had an adverse effect on many trees. Minnesota reported that numerous trees lost their leaves and dried up in August. Birch and maples were the first species to exhibit symptoms. Wisconsin reported more-than-usual losses from two-lined chestnut borer and bark beetle activity because of the drought.

# MYCORRHIZAL SURVEYS

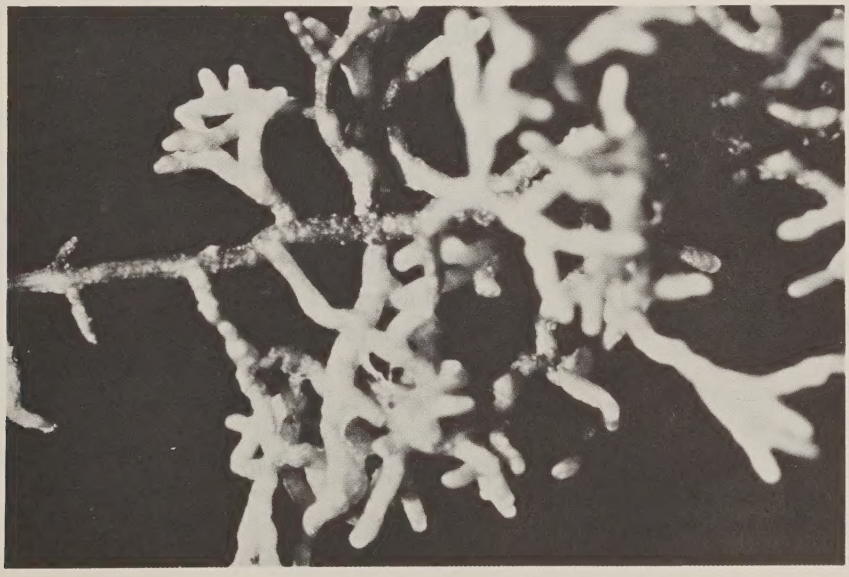

Fig. 15. – Ectomycorrhizal feeder root development on red pine.

Surveys of mycorrhizae in nurseries in Wisconsin, Minnesota, Michigan, Iowa, Illinois, and Missouri have shown that, in general, red pine has poor ectomycorrhizae development, Scotch pine medium development, and white pine the best development (Fig. 15). A limited evaluation of yellow birch indicated that it had excellent development. A survey of development in black walnut seedlings in 18 nurseries in the Eastern United States, showed endomycorrhizae present in all of the seedlings.

Methods for increasing mycorrhizal development are currently being developed and tested. Results from pilot projects involving inoculation of seedbeds with mycorrhizae should be available in 1977.

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